Management Indicator Species Report

Social and Ecological Resilience Across the Landscape (SERAL)

Supervisor's Office

Stanislaus National Forest

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1. INTRODUCTION

The purpose of this report is to evaluate and disclose the impacts of the Social and Ecological Resilience Across the Landscape (hereafter "SERAL" or "project") on the habitat of the thirteen (13) Management Indicator Species (MIS) identified in the Stanislaus (NF) Land and Resource Management Plan (LRMP) (USDA 1991) as amended by the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (USDA Forest Service 2007a). This report documents the effects of the proposed action on the habitat of selected project-level MIS. Detailed descriptions of the project are found in the NEPA document: https://www.fs.usda.gov/projects/stanislaus/landmanagement/projects.

MIS are animal species identified in the SNF MIS Amendment Record of Decision (ROD) signed December 14, 2007, which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the Stanislaus LRMP as amended by the 2007 SNF MIS Amendment ROD directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of MIS, as identified in the Stanislaus Forest plan Direction.

1.a. Direction Regarding the Analysis of Project-Level Effects on MIS Habitat

Project-level effects on MIS habitat are analyzed and disclosed as part of environmental analysis under the National Environmental Policy Act (NEPA). This involves examining the impacts of the proposed project alternatives on MIS habitat by discussing how direct, indirect, and cumulative effects will change the habitat in the analysis area.

These project-level impacts to habitat are then related to broader scale (bioregional) population and/or habitat trends. The appropriate approach for relating project-level impacts to broader scale trends depends on the type of monitoring identified for MIS in the LRMP as amended by the SNF MIS Amendment ROD. Hence, where the Stanislaus NF LRMP as amended by the SNF MIS Amendment ROD identifies distribution population monitoring for an MIS, the project-level habitat effects analysis for that MIS is informed by available distribution population monitoring data, which are gathered at the bioregional scale. The bioregional scale monitoring identified in the Stanislaus NF LRMP, as amended, for MIS analyzed for the project is summarized in Section 3 of this report.

Adequately analyzing project effects to MIS generally involves the following steps:

- Identifying which habitat and associated MIS would be either directly or indirectly affected by the project alternatives; these MIS are potentially affected by the project.
- Summarizing the bioregional-level monitoring identified in the LRMP, as amended, for this subset of MIS.
- Analyzing project-level effects on MIS habitat for this subset of MIS.
- Discussing bioregional scale habitat and/or population trends for this subset of MIS.

- □ Relating project-level impacts on MIS habitat to habitat and/or population trends at the bioregional scale for this subset of MIS.

These steps are described in detail in the Pacific Southwest Region's draft document "MIS Analysis and Documentation in Project-Level NEPA, R5 Environmental Coordination" (May 25, 2006) (USDA Forest Service 2006a). This Management Indicator Species (MIS) Report documents application of the above steps to select project-level MIS and analyze project effects on MIS habitat for the project.

1.b. Direction Regarding Monitoring of MIS Population and Habitat Trends at the Bioregional Scale.

The bioregional scale monitoring strategy for the Stanislaus NF's MIS is found in the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (ROD) of 2007 (USDA Forest Service 2007a). Bioregional scale habitat monitoring is identified for all twelve of the terrestrial MIS. In addition, bioregional scale population monitoring, in the form of distribution population monitoring, is identified for all terrestrial MIS except for the greater sage-grouse. For aquatic macroinvertebrates, the bioregional scale monitoring identified is Index of Biological Integrity and Habitat. The current bioregional status and trend of populations and/or habitat for each of the MIS is discussed in the 2010 Sierra Nevada Forests Bioregional Management Indicator Species (SNF Bioregional MIS) Report (USDA Forest Service 2010a).

- **MIS Habitat Status and Trend.**

All habitat monitoring data are collected and/or compiled at the bioregional scale, consistent with the LRMP as amended by the 2007 SNF MIS Amendment ROD (USDA Forest Service 2007a).

Habitats are the vegetation types (for example, early seral coniferous forest) or ecosystem components (for example, snags in green forest) required by an MIS for breeding, cover, and/or feeding. MIS for the Sierra Nevada National Forests represent 10 major habitats and 2 ecosystem components (USDA Forest Service 2007a), as listed in Table 1. These habitats are defined using the California Wildlife Habitat Relationship (CWHR) System (CDFG 2005). The CWHR System provides the most widely used habitat relationship models for California's terrestrial vertebrate species (ibid). It is described in detail in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

Habitat status is the current amount of habitat on the Sierra Nevada Forests. Habitat trend is the direction of change in the amount or quality of habitat over time. The methodology for assessing habitat status and trend is described in detail in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a). As of May 2017, the Region is awaiting updated mapping products to facilitate updated habitat status and trend analysis following the recent (2014-2017) drought-induced tree mortality in the Southern Sierra Nevada. Habitat status and trend information in this report is updated with hypotheses based on suspected mortality effects where applicable and will be updated and confirmed once the maps are complete.

- **MIS Population Status and Trend.**

All population monitoring data are collected and/or compiled at the bioregional scale, consistent with the LRMP as amended by the 2007 SNF MIS Amendment ROD (USDA Forest Service

2007a). The information is presented in detail in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

Population monitoring strategies for MIS of the Stanislaus NF are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment ROD (USDA Forest Service 2007a). Population status is the current condition of the MIS related to the population monitoring data required in the 2007 SNF MIS Amendment ROD for that MIS. Population trend is the direction of change in that population measure over time.

There are a myriad of approaches for monitoring populations of MIS, from simply detecting presence to detailed tracking of population structure (USDA Forest Service 2001, Appendix E, page E-19). A distribution population monitoring approach is identified for all of the terrestrial MIS in the 2007 SNF MIS Amendment, except for the greater sage-grouse (USDA Forest Service 2007a). Distribution population monitoring consists of collecting presence data for the MIS across a number of sample locations over time. Presence data are collected using a number of direct and indirect methods, such as surveys (population surveys), bird point counts, tracking number of hunter kills, counts of species sign (such as deer pellets), and so forth. The specifics regarding how these presence data are assessed to track changes in distribution over time vary by species and the type of presence data collected, as described in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

- **Aquatic Macroinvertebrate Status and Trend.**

For aquatic macroinvertebrates, condition and trend is determined by analyzing macroinvertebrate data using the predictive, multivariate River Invertebrate Prediction And Classification System (RIVPACS) (Hawkins 2003) to determine whether the macroinvertebrate community has been impaired relative to reference condition within perennial water bodies. This monitoring consists of collecting aquatic macroinvertebrates and measuring stream habitat features according to the Stream Condition Inventory (SCI) manual (Frasier et al. 2005). The State Water Board's Perennial Streams Assessment (PSA) program, in collaboration with several other regional and national partners, conducted bioassessment sampling at nearly 2,000 probabilistic stream locations in California from 2008-2018 (CDFW 2021). This assessment included 114 samples taken from the Sierra Nevadan National Forests as part of the MIS program.

2. SELECTION OF PROJECT LEVEL MIS

Management Indicator Species (MIS) for the Stanislaus NF are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA Forest Service 2007a). The habitats and ecosystem components and associated MIS analyzed for the project were selected from this list of MIS, as indicated in Table 1. In addition to identifying the habitat or ecosystem components (1st column), the CWHR type(s) defining each habitat/ecosystem component (2nd column), and the associated MIS (3rd column), the Table discloses whether or not the habitat of the MIS is potentially affected by the project (4th column).

Table 1. Selection of MIS for Project-Level Habitat Analysis for the Project.

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component[1]	Sierra Nevada Forests Management Indicator Species *Scientific Name*	Category for Project Analysis[2]
Riverine & Lacustrine	lacustrine (LAC) and riverine (RIV)	aquatic macroinvertebrates	3
Shrubland (west-slope chaparral types)	montane chaparral (MCP), mixed chaparral (MCH), chamise-redshank chaparral (CRC)	fox sparrow *Passerella iliaca*	3
Oak-associated Hardwood & Hardwood/conifer	montane hardwood (MHW), montane hardwood-conifer (MHC)	mule deer *Odocoileus hemionus*	3
Riparian	montane riparian (MRI), valley foothill riparian (VRI)	yellow warbler *Dendroica petechia*	2
Wet Meadow	Wet meadow (WTM), freshwater emergent wetland (FEW)	Pacific tree (chorus) frog *Pseudacris regilla*	2
Early Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2, and 3, all canopy closures	Mountain quail *Oreortyx pictus*	3
Mid-Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures	Mountain quail *Oreortyx pictus*	3
Late Seral Open Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P	Sooty (blue) grouse *Dendragapus obscurus*	3
Late Seral Closed Canopy	ponderosa pine (PPN), Sierran	California spotted owl	3

[1] All CWHR size classes and canopy closures are included unless otherwise specified; dbh = diameter at breast height; Canopy Closure classifications: S=Sparse Cover (10-24% canopy closure); P= Open cover (25-39% canopy closure); M= Moderate cover (40-59% canopy closure); D= Dense cover (60-100% canopy closure); Tree size classes: 1 (Seedling)(<1" dbh); 2 (Sapling)(1"-5.9" dbh); 3 (Pole)(6"-10.9" dbh); 4 (Small tree)(11"-23.9" dbh); 5 (Medium/Large tree)(>24" dbh); 6 (Multi-layered Tree) [In PPN and SMC] (Mayer and Laudenslayer 1988).

[2] Category 1: MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.
Category 2: MIS whose habitat is in or adjacent to project area but would not be either directly or indirectly affected by the project.
Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component[1]	Sierra Nevada Forests Management Indicator Species *Scientific Name*	Category for Project Analysis[2]
Coniferous Forest	mixed conifer (SMC), white fir (WFR), red fir (RFR), tree size 5 (canopy closures M and D), and tree size 6.	*Strix occidentalis occidentalis*	
		Pacific marten *Martes caurina*[3]	
		northern flying squirrel *Glaucomys sabrinus*	
Snags in Green Forest	Medium and large snags in green forest	hairy woodpecker *Picoides villosus*	3
Snags in Burned Forest	Medium and large snags in burned forest (stand-replacing fire)	black-backed woodpecker *Picoides arcticus*	3

Effects to riparian habitat will not be analyzed further because hydrology best management practices, standards, guidelines, and management requirements will prevent significant changes to the quantity of riparian habitat available.

The MIS whose habitat would be either directly or indirectly affected by the project, identified as Category 3 in Table 1, are carried forward in this analysis, which will evaluate the direct, indirect, and cumulative effects of the proposed action and alternatives on the habitat of these MIS. The MIS selected for project-level MIS analysis for the project are: aquatic macroinvertebrates, fox sparrow, mule deer, mountain quail, sooty grouse, California spotted owl, Pacific marten, northern flying squirrel, hairy woodpecker, and black-backed woodpecker.

3. Bioregional Monitoring Requirements for MIS Selected for Project-Level Analysis

3.a. MIS Monitoring Requirements.

The Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA Forest Service 2007a) identifies bioregional scale habitat and/or population monitoring for the Management Indicator Species for ten National Forests, including the Stanislaus NF. The habitat and/or population monitoring requirements for Stanislaus NF’s MIS are described in the 2010 Sierra Nevada Forests Bioregional Management Indicator Species (SNF Bioregional MIS) Report (USDA Forest Service 2010a) and are summarized below for the MIS being analyzed for the project. The applicable habitat and/or population monitoring results are also described in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a) and are summarized in Section 5 below for the MIS being analyzed for the project.

[3] Identified as American Marten (Martes americana) in original MIS designation. Later classified as a separate species by Dawson and Cook (2012).

Habitat monitoring at the bioregional scale is identified for all the habitats and ecosystem components, including the following analyzed for the project: shrubland; oak-associated hardwood & hardwood/conifer; early seral coniferous forest; mid-seral coniferous forest; late seral open canopy coniferous forest; late seral closed canopy coniferous forest; snags in green forest.

Population monitoring at the bioregional scale for fox sparrow, mule deer, mountain quail, sooty grouse, California spotted owl, Pacific marten, northern flying squirrel, hairy woodpecker, and black-backed woodpecker: distribution population monitoring. Distribution population monitoring consists of collecting presence data for the MIS across a number of sample locations over time (also see USDA Forest Service 2001, Appendix E).

3.b. How MIS Monitoring Requirements are Being Met.

Habitat and/or distribution population monitoring for all MIS is conducted at the Sierra Nevada scale. Refer to the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a) for details by habitat and MIS.

4. DESCRIPTION OF PROPOSED PROJECT.

Refer to the SERAL Draft EIS for in depth discussion on the alternatives, including those not analyzed in detail. Management requirements specific to each alternative are listed following the alternative description and management requirements common to all alternatives are listed at the beginning of this section.

Management Requirements (Terrestrial Wildlife) Common to All Action Alternatives

1. Prior to implementation, route a site-specific Project Input Form (PIF) and conduct surveys in compliance with the USFS Pacific Southwest Region's survey protocols to establish or confirm current locations of sensitive species and sites, such as nest activity centers and roost sites for spotted owl, great gray owl, and goshawk.
2. Prior to implementing activities within PACs, the responsible Forest Service Line Officer, in consultation with the wildlife biologist, will approve treatment area layout to ensure current survey results are incorporated and that appropriate buffer distances are in place to avoid nest activity centers and roost sites, including alternate nests and roosts for California spotted owl, great gray owl, and goshawk. Activities will be reviewed and approved on an annual basis until treatments within the PACs are completed.
3. In Alternative 1, mechanical treatments may only occur in up to one-third (100 acres) of California spotted owl PACs.
4. Maintain a limited operating period (LOP) prohibiting mechanical operations within 0.25 mile of activity center points during the breeding season for California spotted owls (March 1 through August 15), northern goshawks (February 15 through September 15), great gray owls (March 1 through August 15), marten den sites (May 1 through July 31), and within the specified distance of the known bald eagle nest (January 1 through August 31) as per the National Bald Eagle Management Guidelines. LOPs may be lifted by a

Forest Service biologist based on non-nesting status or if a biologist determines that a particular action is not likely to cause breeding disturbance given the intensity, duration, timing, or specific location of the activity.

5. Retain the largest snags and down logs available at the rates listed in **Error! Reference source not found.**. Snag retention should be prioritized by size as follows (from highest to lowest priority): (1) very large snags (>36-inch DBH); (2) large snags (> 24-inch DBH); (3) medium snags (>15inch DBH). A snag is defined as a dead tree greater than 20 feet in height. Large down log retention should prioritize the largest size classes of logs with a minimum of 20 inches diameter at midpoint and decay classes 1, 2, and 3 (MR1, USDA 2017, S&G 10).

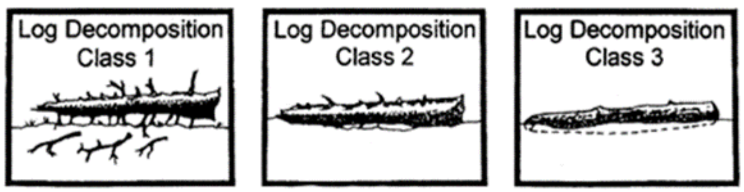

Figure MR1. Decay Classes

Table MR 1. Snag and down log retention rates.

Location		Snag Retention Rate	Down Log Retention Rate
Within Fuelbreaks	Inner Core	No retention required	No retention required
	Outer Core	2 of the largest per acre	2 of the largest per acre
Outside of Fuelbreaks	Mixed Conifer and Pine Forest Type	4 of the largest per acre	4 of the largest per acre
	Hardwood Forest Type	4 of the largest per acre	4 of the largest per acre
	Red Fir Forest Type	6 of the largest per acre	4 of the largest per acre

6. If nesting or foraging habitat in PACs is mechanically treated for fuelbreaks, mitigate by adding acreage to the PAC equivalent to the treated acreage wherever possible. Add adjacent acres of comparable quality wherever possible (Table B.1 SPEC-CSO-GDL-03).
7. Notify a US Forest Service Wildlife Biologist if any Federally listed or Region 5 Forest Service Sensitive species are discovered during project implementation so that LOPs or other protective measures can be applied, if needed. Include necessary clauses in agreements and contracts to require notification.
8. Ensure PAC, Territory, or HRCA DBH limits are met as defined in DEIS Summary Table S-2.

ALTERNATIVE 1 (Modified - PROPOSED ACTION)

This is the Proposed Action, as described in the Notice of Intent (Federal Register Vol. 85, No. 137, Thursday, July 16, 2020 p. 43205-43206) with modifications made in response to public comment and collaborative feedback. Alternative 1 – the modified proposed action, was developed to meet the purpose and needs of the project in collaboration with Yosemite Stanislaus Solution collaborative group. Actions proposed in Alternative 1 include, the construction and maintenance of fuelbreaks, prescribed fire, understory and surface fuel reduction, forest thinning, and non-native invasive weed control and eradication treatments. The proposed actions included in this alternative were crafted to adopt the management approaches and conservation measures presented in the 2019 Conservation Strategy for the California Spotted Owl in the Sierra Nevada (hereafter referred to as the CSO Strategy), including a suite of project-specific forest plan amendments to align the Stanislaus National Forest Land and Resource Management Plan with the direction of the CSO Strategy.

ALTERNATIVE 2 (NO ACTION)

Alternative 2 (No Action) is the "no action" alternative. Under this Alternative, no actions would occur.

ALTERNATIVE 3

Alternative 3 represents a version of the modified proposed action developed in compliance with current management direction as written in the Stanislaus National Forest Land and Resource Management Plan. Alternative 3 does not include any project-specific forest plan amendments or adopt the management approaches or conservations measures presented in the CSO Strategy.

ALTERNATIVE 4

Alternative 4 represents an alternative which was developed to comprehensively address comments and concerns as well as incorporate suggestions received during the scoping period. Like Alternative 3, Alternative 4 has been developed under the direction of the current Stanislaus National Forest Land and Resource Management Plan, does not adopt the CSO Strategy or include a forest plan amendment. Unlike the other action alternatives, however, Alternative 4 does not include the salvage of drought, insect, disease, or fire killed trees, temporary road construction, or herbicide use for the control and eradication of non-native invasive weeds.

Existing Condition

The SERAL action area occurs at elevations ranging from 1,064 feet to 7,863 feet. This landscape is comprised of vegetative communities including grassland, meadows, oak woodlands, chaparral, lower westside ponderosa pine, mixed conifer and high elevation true fir and lodgepole pine. The majority of forested area is Sierran Mixed Conifer, which includes ponderosa pine, incense cedar, white fir, sugar pine, and black oak. Plantations are also present throughout the project area and consist mainly of ponderosa pine. Other tree species found less frequently include live oak, cottonwood, alder, birch, and Douglas fir. Shrub species present include green leaf and white leaf manzanita, deer brush, chinquapin, mountain whitethorn, buck brush, gooseberry, toyon, and birch leaf mountain mahogany.

Dominant habitat types are often described by using the CWHR model (Mayer and Laundenslayer 1988).

Table 2. Dominant habitat types in the SERAL project area (acres are from raster-based data products and may differ slightly from vector-based data products).

General Vegetation Type	Total Acres / Percent of Total (NFS and non-NFS lands)	NFS Land Acres / Percent of Total NFS Lands

		(NFS lands only)
Yellow Pine / Dry Mixed Conifer	73,030 / 61%	58,143 / 61%
Oak Woodland	21,421 / 18%	17,737 / 19%
Shrub	15,321 / 13%	11,736 / 12%
Fir / Moist Mixed Conifer	6,753 / 6%	6,113 / 6%
Herbaceous	1,104 / <1%	489 / <1%
Non-Vegetated	1,166 / <1%	562 / <1%
TOTAL[4]	118,795 / 100%	94,779 / 100%

The total analysis area boundary encompasses 118,795 acres. Unless otherwise specified, the area used to analyze the direct and indirect effects on wildlife and wildlife habitat is about 94,779 acres of Stanislaus National Forest System lands within the project boundary. An additional 24,016 acres are not National Forest lands. The analysis area is based on 1) the area of impact to forest vegetation from proposed project activities, and 2) furthest measurable extent of changes to disturbance levels and habitat modification that would occur as a result of implementing any of the proposed alternatives. This analysis is bounded in time for short-term effects (up to 20 years) and long-term effects (up to 50 years).

The project area is 1) severely departed from NRV and 2) extremely vulnerable to large high-severity wildfire that threatens mature forest habitat and human communities. Departure from NRV is shown in detail by ForSys products and models and in the SERAL DEIS. NRV or Natural Range of Variation is the variation of ecological characteristics and processes over scales of time and space appropriate for a given management application (USDA Forest Service 2019).

Vulnerability to large high-severity wildlife is illustrated by recent examples in the project footprint such as the Quarter Fire, Tunnel Fire, Lyons Fire, and the Bald Fire (Figure 1). All four incidents were unplanned fire starts that were fortunately detected early and had sufficient firefighting resources available. These incidents represent "near misses" or "close calls" of potential uncontrolled megafire and demonstrate the urgent need to increase pace and scale to reduce fire risk in the SERAL landscape.

Case 1. Quarter Fire, June 2020. The Quarter Fire was first detected on a sideslope of the Middle Fork Stanislaus River Canyon. Despite starting early in the fire season, growth potential was high based on slope position and fuel conditions. Were this fire to escape containment, it was expected to threaten at least 15 CSO PACs and the communities of Sugar Pine and Mi-Wok Village.

Case 2. Tunnel Fire, August 2020. The Tunnel Fire was controlled at just one acre attributed to a rapid response by fire personnel. This fire was dangerously positioned to align with Beardsley Canyon threatening a King Fire type scenario and jeopardizing at least 12 CSO PACs.

Case 3. Lyons Fire, May 2021. The Lyons Fire origin occurred somewhat in a bowl and was expected to burn in all directions, jeopardizing at least 15 CSO PACs.

Case 4. Bald Mountain Fire, July 2021. The Bald Mountain Fire was first detected on a side slope of the South Fork Stanislaus River Canyon. This fire was discovered in the morning and was already very actively burning and five acres in size with forward spread and spotting. Growth potential was extreme, and this fire had high potential to "blow up" and burn thousands of acres at high severity. The location of this fire start, and existing fuel loads, weather, and fire behavior indicated this fire was on a trajectory to potentially burn at least 19 CSO PACs at high severity. This fire also threatened to burn several human

[4] F3 derived data are raster-based products and acres are approximate and explain why the total project area and NFS land acres do not equal 118,808 and 94,823 acres respectively.

communities at high severity including Cold Springs, Camp High Sierra, Strawberry, and Pinecrest. Fortunately, enough firefighting resources were available at the time; it took 2 airtankers, 2 helicopters, 3 hand crews, 2 dozers, 2 water tenders, and 6 engines to contain this fire.

Figure 1. Recent "close calls" in the SERAL project area, i.e. actual fire starts with extreme growth potential (CSO PACs shown as green polygons, fire origin as colored circles, and expected fire direction indicated by red arrows).

5. EFFECTS OF PROPOSED PROJECT ON THE HABITAT FOR THE SELECTED PROJECT-LEVEL MIS.

Assumptions

The following assumptions were applied to all alternatives:

The following assumptions were applied to this analysis:

- This analysis assumes all project actions follow all project requirements.
- This analysis assumes that the pace and scale of treatments increases over the past (see Purpose and Need) and that treatments are completed within a short time frame (within about 5-15 years).
- This analysis assumes that temporary roads ("temp roads") follow best management practices for soils and hydrology and are sufficiently blocked and decommissioned after use such that they return to a natural state in a short time frame (typically < 5 years). Temp roads are limited in extent and potential for impact by requirements and best management practices (BMPs) including the following

(see Soils and Watershed Management sections in the SERAL DEIS): 1) remove crossing structures and restore stream channels and natural hillslope drainage, 2) ensure road is effectively drained (e.g. waterbars, dips, outsloping) and treated to return the road prism to near natural hydrologic function, 3) block road to prevent vehicle access, 4) treat and stabilize road surfaces through subsoiling, scattering slash, and/or revegetation, 5) reshape and stabilize side slopes as needed, and 6) subsoil or decompact all temporary roads project wide to a depth of 24 inches, except where high rock content, slope, moisture content, depth to restricting layer, and erosion hazard would limit subsoiling feasibility. The need for temp roads is estimated to be minimal, less than 1 mile per 1,000 acres treated and < 26 miles in the entire project area. In addition, previous temp roads would be reused whenever possible to further minmize potential impact. Because the use of temporary roads is limited in scope, intensity, and duration for this project spatially and temporally, potential impacts are expected to remain well below threshold levels for effects on terrestrial wildlife. Similarly, road reconstruction and maintenance activities will comply with the Forest Plan and follow best management practices for soils and hydrology and potential impacts are expected to remain well below threshold levels for effects on terrestrial wildlife.

- This analysis tiers to Risk Assessment documents (https://www.fs.fed.us/foresthealth/protecting-forest/integrated-pest-management/pesticide-management/pesticide-risk-assessments.shtml) prepared by the Region for the use of herbicides, borate, and bark beetle pheromone, and are here incorporated by reference including SERA 2004, 2007, 2010, 2011a-d, 2014, and 2016a-b. These documents show that the use of these materials for the management of nonnative invasive weeds, root diseases, and bark beetle tree protection in this project would not be of sufficient scale or scope to impact any terrestrial wildlife species (see SERAL DEIS for a description of specific agents proposed for this project). The toxicity exposure scenarios analyzed in the risk assessment show that all hazard quotients (HQs) are several orders of magnitude less than the NOAEL threshold of concern or No Observable Adverse Effect Level. Known infestations of nonnative invasive weeds in the 118,808 acre SERAL project area currently total only about 200 acres. This is because the Forest's weed management strategy focuses on small, newly established infestations (see Invasive Plant Risk Assessment) and does not map or address (other than standard best management practices and preventative measures such as requiring clean weed-free equipment) widespread well-established nonnative weeds (e.g., cheatgrass) for which direct treatments would be cost-prohibitive and/or ineffective. Thus, the use of herbicides is expected to entail very targeted and limited spot treatments primarily focused on new infestations. New infestations are typically small and are a priority for treatment to prevent spread across the greater landscape. This technique is called "Early Detection and Rapid Response" (EDRR) and follows many successful examples used in Burned Area Emergency Response (BAER) actions (US Department of Interior 2016; Reaser et al. 2020). Following the EDRR strategy, other integrated weed management techniques such as hand-pulling or mulching will primarily be used so herbicide use would be further limited and only used as a "last resort". Additionally, hand-pulling and mulching activities are also expected to not be of sufficient scale or scope to impact any terrestrial wildlife species directly through that activity (i.e. noise or ground disturbance). Instead, EDRR actions simply promote native plants and ecosystem integrity long-term for the benefit of all terrestrial wildlife. Likewise, the use of bark beetle repellents is expected to be minimal and limited to targeted use of individual trees such as special high-value trees in campgrounds, administrative sites, or nest trees in PACs.
- This analysis tiers to the DEIS analysis for salvage occurring in Alternative 1 as a rapid response prescription option covered under the umbrella of forest management. That analysis is incorporated here by reference (see SERAL DEIS). Potential effects are considered under forest management because 1) any salvage (other than hazard trees) would be NRV based, 2) any potential rapid response salvage represents a prescription change that overlaps forest management acres analyzed, and 3) specific spatial and temporal constraints have been put in place to minimize potential effects. Any salvage proposed outside of those constraints would be subject to post-disturbance environmental

planning and analysis, opportunities for public engagement, administrative review, and decisions (36 CFR 218). A summary of the spatial and temporal constraints include (see SERAL DEIS for detail):

1) must be driven by a NRV need, e.g., salvage of wildfire-killed trees may only occur when patches burned at high severity exceed 10 percent of the landscape, and salvage of insect, beetle or drought killed trees would not occur when mortality patches are less than 10 acres in size, or until multiple patches comprise more than 15% of the landscape,
2) salvage may not occur within ¼ mile of an eligible Wild and Scenic River,
3) salvage of wildfire-killed trees may not occur within PACs (Protected Activity Centers),
4) salvage of wildfire-killed trees is limited to the interior of highly disturbed areas to retain disturbed corridors along green forest edges [e.g., within 325 feet of green forest edge as in findings of Jones et al. (2020a) because green forest edges may provide potential owl foraging habitat in the short-term (USDA 2019, Approach 1, 7 a, b, c, and d)],
5) salvage of wildfire-killed trees is limited to a maximum of 500 acres per HUC 6 watershed totaling approximately 3,000 acres within the project area,
6) salvage of wildfire-killed trees may only occur within 7 years of the SERAL Decision,
7) salvage of insect, disease, or drought killed trees may only occur within 0.25 miles of maintenance level 2, 3, 4, and 5 National forest system (NFS) roads,
8) any temporary roads constructed to complete the salvage action must remain less than 500 feet and must ensure all sensitive resources are protected from harm,
9) salvage must target smaller diameter accumulated fuels which wouldn't exist historically because regular, low-intensity fires would have prevented their existence, and salvage must retain the largest standing snags to provide legacy large logs that then become incorporated into the future forest structure (see management requirements), and
10) no salvage is authorized to occur if the watershed condition exceeds the Threshold of Concern (TOC).

Table 3. Summary of terrestrial MIS habitat acres in the SERAL Project Area of the Stanislaus National Forest.

MIS Habitat	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Shrubland (west-slope chaparral types)	11,736	11,736	11,736	11,736
Oak-associated Hardwood & Hardwood/conifer	21,421	21,421	21,421	21,421
Early Seral Coniferous Forest	5,040	5,359	5,081	5,110
Mid Seral Coniferous Forest	40,813	48,884	44,497	45,619
Late Seral Open Canopy Coniferous Forest	11,370	0	4,958	4,426
Late Seral Closed Canopy Coniferous Forest	7,010	10,012	9,692	9,074
Snags in Green Forest	49,614	58,306	49,567	49,539
Snags in Burned Forest	517	517	517	517

The following section documents the analysis for the 'Category 3' species in Table 1. The analysis of the effects of the project on the MIS habitat for the selected project-level MIS is conducted at the project scale. Detailed information on the MIS is documented in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Cumulative effects at the bioregional scale are tracked via Pacific Southwest Region MIS Bioregional monitoring and detailed in the Bioregional MIS Reports (USDA Forest Service, Pacific Southwest Region).

Lacustrine/Riverine Habitat (Aquatic Macroinvertebrates)

A. *Habitat/Species Relationship.*

Aquatic or Benthic Macroinvertebrates (BMI) were selected as the MIS for riverine and lacustrine habitat in the Sierra Nevada. They have been demonstrated to be very useful as indicators of water quality and aquatic habitat condition (Resh and Price 1984; Karr et al. 1986; Hughes and Larsen 1987; Resh and Rosenberg 1989). They are sensitive to changes in water chemistry, temperature, and physical habitat; aquatic factors of particular importance are: flow, sedimentation, and water surface shade.

B. *Project-level Effects Analysis – Lacustrine/Riverine Habitat*

Habitat Factor(s) for the Analysis: Flow; Sedimentation; and Water surface shade.

Current Condition of the Habitat Factor(s) in the Project Area: For aquatic macroinvertebrates, there are approximately 22,405 acres in riparian conservation areas (RCAs) as defined in USDA (2004). This acreage includes a 300-foot buffer along each side of a perennial stream and a 150-foot buffer along intermittent streams. Detailed information is not known for most of the area in the project area, but the forest has completed some survey of other similar streams across the forest to provide enough information to generalize the existing condition of RCAs. Relevant information collected through implementation of the Stanislaus Streamscape Inventory (USDA 2008b), or SSI surveys, include measures on stream flow, stream sedimentation, stream shading, and type, density, and age structure of obligate riparian species.

For the most part, streams have low to moderate levels of sediment which can be patchily distributed. In general, higher gradient sections of streams have low amounts of fine sediment and lower gradient sections have higher amounts. High levels of sediment in streams is less than desirable from the perspectives of high-functioning aquatic habitat, high productivity aquatic habitat, and the physical processing of streambed sediments from upstream areas to downstream areas. Things like fish reproduction can be decreased under high sediment conditions and a diversity of in-stream habitats for aquatic insects (food to many aquatic and terrestrial animals) is decreased when the spaces in, under, and around substrates (rocks) in the stream are enveloped. None of the streams we have surveyed to date have had levels of fine sediment that would be considered detrimental to aquatic species.

Stream shading is also variable on surveyed streams. Some streams are in narrow canyons with north-south orientation where the adjacent hillslopes provide abundant shade, some are in dense and mature forest with high levels of shading provided by conifers next to the stream, while others have reaches that are fairly open with little shade due to landform features such as extensive rock outcrops. Basically, streams need some areas with less shading to promote primary productivity through the growth of algae on the streambed and other areas of denser shade to keep water cool for species that require that consideration. Most of the streams that we have surveyed have followed this pattern of some reaches, sometimes contiguous, of high levels of shading (>60% of the surface shaded) and other reaches with lower levels of shading (<50%). If shading averages around 60%, cool water temperatures are generally maintained and this is what is observed across the forest.

The composition, density, and age distribution of obligate riparian species, those that need to grow in wet soils, is also useful because these deciduous plants provide leaf fall into the water, provide seasonal shading, and help maintain streambank stability. Some examples of obligates include alders, willows, cottonwoods, and aspens. As with the other two attributes we have measured, variable conditions are the norm with some places having very dense, young obligate vegetation and other reaches with sparse and old riparian vegetation. The latter condition frequently exists in those reaches with dense conifer canopy while the former condition is often observed in areas affected by wildfire. Most obligate riparian species are adapted to disturbance events and re-sprout vigorously even when they appear to be “killed”.

Streamflow is also variable across the project area and there, frankly, are too many miles and streams to provide an overview of the existing condition. Streams in the project area range from a large river, the Middle Fork Stanislaus, to numerous small streams. The thing is, regardless of the alternative chosen for the project, the level of vegetation management would not be sufficient to result in a measurable change in flow. Therefore, this habitat factor will not be discussed further.

Alternative 1 (Proposed Action)

Direct and Indirect Effects to Habitat. Table 4 shows the amount of project activity, by activity type, that would occur in RCAs. It should be noted that not all of the treatments that occur in any given area of RCA would have an effect on a habitat factor, rather it provides an idea of the extent of activity occurring near the stream. For example, we could be thinning a 30 year old plantation where the trees are only 40 feet tall. If thinning occurs 100 feet away (or more) then that might not have any effect on stream shading because the tree isn’t tall enough to provide shade for the stream.

Table 4. Acreage of riparian conservation area affected by treatment type for Alternative 1 of the SERAL project.

Treatment type	Acres of RCA affected
Prescribed fire (burn only)	531
Forest Thinning - Harvest	4,647
Forest Thinning - Other	648
Fuelbreak	1,791
Mechanical Fuels Treatment	1,101
Total	**11,718 (52% of total RCA area)**

All of the treatment types listed in the table above have the potential to affect stream shading and sedimentation. Stream shading could be affected through the removal of canopy trees that are merchantable or constitute biomass or excess fuels. The level of canopy reduction is dependent on the objective of the treatment unit with shaded fuelbreaks likely resulting in the greatest reduction of shading and prescribed fire having the least impact on stream shading. The minimum retention of canopy cover allowed under the project would be 50%. Within treatment units, the reduction in conifer canopy and some alteration of obligate riparian vegetation (only from fire) in the immediate streamside RCA would potentially enhance the role of these deciduous species by providing additional leaf inputs, enhance primary and secondary productivity and seasonal shading. Approximately 50% of the RCA would be unaltered by project activities, which, when combined with the treated areas where shading is retained, should maintain water temperature regimes within the variability bounds conducive to maintaining habitat for robust and diverse aquatic macroinvertebrate communities.

Project activities, mainly those involving mechanical treatments (equipment), have a low potential for creating conditions vulnerable to erosion and delivering sediment to the streams in the project area. Table 4 shows that most of the project activities would involve mechanical processes, so around 50% of the total RCA would be vulnerable to areas that could produce sediment. The overall risk of detrimental (habitat altering) sedimentation is limited by project management requirements that dictate the retention of ground cover adequate and limitations on where equipment can operate to prevent substantive erosion and the implementation of Best Management Practices (BMPs) to prevent sediment from reaching waters and impairing beneficial uses. This is a two step process, keep the soil on the hillslope and, if it does move, keep it from entering the water.

Cumulative Effects to Habitat in the Analysis Area. I used the hydrologist's assessment of cumulative watershed effects to evaluate previous, ongoing and future (= cumulative) actions in each of the six HUC 12 watersheds (size range 11,000 to 30,000 acres). This watershed sizing (using HUC12) is relevant to assessing cumulative effects because it typically encompasses a major stream system (Rose and Cow Creeks) or a smaller segment of a larger river (lower Middle Fork Stanislaus or lower South Fork Stanislaus) with some of the river's tributaries. Part of the reasoning behind relying on the CWE analysis is that the model uses numerical values for activities that can be summed and compared to a threshold of concern (TOC) for any given watershed. As the watershed approaches the TOC, there is an expectation that the physical processes that affect a stream's proper functioning could be compromised and large scale effects to habitat become more likely once the TOC is exceeded. If a watershed stays well below the TOC, physical processes should remain stable and biological processes would be stable as well. Stable habitat, within the bounds of a natural range of variability based on things like geology, means the aquatic macroinvertebrate community should be functioning as expected and comprised of the species expected to occur in any give habitat. Table 5 shows the CWE model results expressed numerically as "equivalent roaded area", or ERA. This assumes a road is the most impacting feature on the landscape. For the sake of brevity and not putting multiple tables into this section, all alternatives have been included. As shown in Table 5, none of the watersheds in the project area approach the minimum TOC for any watershed (12%) and the previous, ongoing, and future actions only add a small percentage to the total, meaning all other activities combined would not result in a watershed exceeding its TOC.

Table 5. Cumulative watershed effects modeling for six 12th level hydrologic unit code watersheds with results expressed as an equivalent roaded area value (percentage) for each alternative of the SERAL project. The lowest threshold of concern for any watershed is 12%

Watershed at HUC 12 level (11,000 to 30,000 acres)	Ongoing/ Future Actions	Previous Actions	Alt 1 Maximum ERA/ Year	Alt 2 Maximum ERA/ Year	Alt 3 Maximum ERA/ Year	Alt 4 Maximum ERA/ Year
Rose Creek	0	0	3.67%/2028	1.10%/2022	3.18%/2028	2.74%/2028
DryMeadow-MFkStanR	0.08	0.03	3.72%/2027	1.32%/2022	2.81%/2026	2.31%/2026
Cow Cr-MFkSR	0.08	0.09	7.08%/2027	2.58%/2022	5.78%/2027	4.50%/2026

Stony Gulch-MFkSR	0.18	0.00	1.47%/2026	1.46%/2022	1.47%/2026	1.46%/2026
Middle SFk Stanislaus R	0.87	0.19	7.78%/2025	3.83%/2022	6.58%/2025	5.32%/2024
Lower SFkSR	0.89	0.0	4.03%/2027	3.58%/2022	4.02%/2027	3.64%/2027

Cumulative Effects Conclusion: Based on the CWE modeling, physical, aquatic habitat in the six watersheds in the project area should remain stable and any changes to physical habitat, mainly sedimentation, would not be expected. The SERAL project could cause localized changes in stream shading, but shading measures averaged throughout stream reaches should not fall below 50% as a result of project activities. There could be beneficial changes to habitat if obligate riparian vegetation is promoted or "refreshed" during project activities.

Alternative 2 (No Action)

Direct, Indirect, and Cumulative Effects to Habitat. Direct and indirect effects to habitat from project activities would not be an issue because no active management would occur. The existing condition of streams in the project area are assumed to be consistent with the information on the Sierra Nevadas presented in the Cumulative Effects section for Alternative 1. Briefly, the streams are likely to be in good condition with the assumption partially substantiated by the consideration that very little broad-scale, active management has occurred in this landscape in decades. These condition of the streams in the project area should remain relatively static, barring any major landscape disturbance like a large, wildfire. In the event of a wildfire, there would be major, but localized, changes to flow, sedimentation, and stream shading because wildfires tend to reduce vegetation density on the landscape which makes more water available for baseflow. Also, moderate and severely burned areas yield very high volumes of sediment to streams, which would increase sedimentation.

Alternative 3

Direct, Indirect, and Cumulative Effects to Habitat. Table 6 shows the amount of project activity, by activity type, that would occur in RCAs under Alternative 3. Because the total acreage treated by mechanical means is so similar and the percentage of RCA acreage affected is slightly less (2% less or 460 acres), there would be no measurable difference between Alternative 3 and Alternative 1. The discussion for Alternative 1, including the cumulative effects discussion (refer to Table 6) applies to Alternative 3.

Table 6. Acreage of riparian conservation area affected by treatment type for Alternative 3 of the SERAL project.

Treatment type	Acres of RCA affected
Prescribed fire (burn only)	3,708
Forest Thinning - Harvest	1,906
Forest Thinning - Other	2,698
Fuelbreak	1,791
Mechanical Fuels Treatment	1,155
Total	**11,258 (50% of total RCA area)**

Alternative 4

Direct, Indirect, and Cumulative Effects to Habitat. Table 7 shows the amount of project activity, by activity type, that would occur in RCAs. Because the total acreage treated by mechanical means is so similar and the percentage of RCA acreage affected is slightly less (3% less or 742 acres), there would be no measurable difference between Alternative 4 and Alternative 1. The discussion for Alternative 1, including the cumulative effects discussion (refer to Table 5) applies to Alternative 4.

Table 7. Acreage of riparian conservation area affected by treatment type for Alternative 4 of the SERAL project.

Treatment type	Acres of RCA affected
Prescribed fire (burn only)	3,715
Forest Thinning - Harvest	313
Forest Thinning - Other	4,110
Fuelbreak	1,791
Mechanical Fuels Treatment	1,047
Total	**10,976 (49% of total RCA area)**

C. ***Summary of Aquatic Macroinvertebrate Status and Trend at*** *the Bioregional Scale*

The Stanislaus NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale Index of Biological Integrity and Habitat monitoring for aquatic macroinvertebrates; hence, the lacustrine and riverine effects analysis for the SERAL Project must be informed by these monitoring data. The sections below summarize the Biological Integrity and Habitat status and trend data for aquatic macroinvertebrates. This information is drawn from the detailed information on habitat and population trends in the 2010 Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat and Index of Biological Integrity Status and Trend. Aquatic habitat has been assessed using Stream Condition Inventory (SCI) data collected since 1994 (Frasier et al. 2005) and habitat status information from the Sierra Nevada Ecosystem Project (SNEP) (Moyle and Randall 1996). Moyle and Randall (1996) developed a watershed index of biotic integrity (IBI) based on distributions and abundance of native fish and amphibian species, as well as extent of roads and water diversions. According to this analysis, seven percent of the watersheds were in excellent condition, 36 percent were in good condition, 47 percent were in fair condition and nine percent were in poor condition.

Sierra Nevada MIS monitoring for aquatic (benthic) macroinvertebrates (BMI) has been conducted annually since 2009. Data collected between 2009 and 2012 were analyzed in detail (Furnish 2013); this analysis is summarized below. Work is ongoing to fully integrate MIS survey results (2009-2016) with statewide and regional surveys to produce the next statewide assessment of stream condition (with expected completion in 2018). Sixty samples of stream and lake aquatic macroinvertebrates were collected from randomly selected sites throughout the Sierra Nevada Province national forests from 2009-2012. At least 290 distinct macroinvertebrate species have been identified from flowing water samples and 114 from lake samples. Collections of periphyton algae, both diatoms and soft-bodied, were made in 2009-10 and 220 algal taxa have been recognized.

Stream MIS biological data were available from 21 sites collected from 2009-10 and evaluated using two models: RIVPACS Observed-to-Expected ratio and western Sierra hydropower Index of Biotic Integrity (IBI). An additional aquatic macroinvertebrate data set was available from the State's Perennial Stream Assessment (PSA) program, which allowed for a more robust analysis with a larger sample size. Both programs have used the same probabilistic sampling design, which allowed for a pooling of the data from both programs. The State Perennial Stream Assessment (PSA) program provided 53 samples from all 10 national forests based on a random site selection process from 2000-2010.

CDFW (2021) analyzed and reported data results from 114 samples taken from National Forests in the Sierra Nevada. Two biological indices, the California Stream Condition Index (CSCI) based on benthic macroinvertebrates and the Algal Stream Condition Index (ASCI) based on benthic algae, and two independent indices of physical habitat condition were used to assess the overall ecological condition, or health, of streams statewide. In general, all indices agreed that the North Coast and Sierra Nevada had the greatest percentage of stream length in healthiest condition. The percentage of stream length in best biological condition during that time frame varied greatly by region (Figure 2b), with the Sierra Nevada having among the highest percentage, 65%, of streams in healthiest condition. The trend for aquatic macroinvertebrates over this time period (2008-2018) indicated CSCI condition getting staying about the same in the Sierra Nevada. The data set for algal indices was incomplete for this time period for the Sierra Nevadas and no trend was available. For physical habitat, based on percent stream length in 'Likely Intact' condition at regional scales, the Index of Physical Integrity (IPI) showed slightly improving conditions in the Sierra Nevada, with no clear trends evident.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Aquatic Macroinvertebrates Habitat Trend. Because the change in sedimentation and shade are too small to be measured relative to the conditions across the range of the Sierra Nevadas, the SERAL Project will not alter the existing trend in the habitat or aquatic macroinvertebrates across the Sierra Nevada bioregion. The SERAL Project would have no effect on stream flow in this region because the project activities are not of sufficient magnitude to result in increases.

Shrubland (West-Slope Chaparral) Habitat (Fox Sparrow)

A. *Habitat/Species Relationship.*

The fox sparrow was selected as the MIS for shrubland (chaparral) habitat on the west-slope of the Sierra Nevada, comprised of montane chaparral (MCP), mixed chaparral (MCH), and chamise-redshank chaparral (CRC) as defined by the California Wildlife Habitat Relationships System (CWHR) (CDFG 2005). Recent empirical data from the Sierra Nevada indicate that, in the Sierra Nevada, the fox sparrow is dependent on open shrub-dominated habitats for breeding (Burnett and Humple 2003, Burnett et al. 2005, Sierra Nevada Research Center 2007).

B. ***Project-level*** *Effects Analysis - Shrubland (West-Slope Chaparral) Habitat*

Habitat Factor(s) for the Analysis:

(1) Acres of shrubland (chaparral) habitat [CWHR montane chaparral (MCP), mixed chaparral (MCH), and chamise-redshank chaparral (CRC)]. (2) Acres with changes in shrub ground cover class (Sparse=10-24%; Open=25-39%; Moderate=40-59%; Dense=60-100%). (3) Acres with changes in CWHR shrub size class (Seedling shrub (seedlings or sprouts <3years); Young shrub (no crown decadence); Mature Shrub (crown decadence 1-25%); Decadent shrub (>25%)

Direct and Indirect Effects to Habitat. Shrub CWHR type covers approximately 11,736 acres of the project area. Action alternatives are not likely to reduce the amount of shrub habitat.

Many shrub species in the project area evolved with fire and benefit from regular fire return intervals. This project would use prescribed fire as the primary tool for managing fuel loads in shrub-dominated areas, and hand or mechanical treatments may be used as well. Shrubs typically benefit and return to the landscape quickly following fire and mechanical treatments. As Forsys modeling focuses on resiliency measures on overstory and tree cover types, the model may underestimate increases in shrubs likely to occur throughout thinned units (e.g., as happened in the Stanislaus-Tuolumne variable density thinning study). Therefore, habitat for fox sparrow and associated species may be expected to increase somewhat over existing condition. Under Alternative 2 No Action, there is no change in shrub cover short-term, but because large-scale disturbance risk would remain high, and because shrub cover typically increases after disturbances, the shrub habitat type may be expected to increase several orders of magnitude post-disturbance.

Cumulative Effects to Habitat in the Analysis Area. The Forest queried its databases, State databases, and others (SERAL DEIS Appendix A) to determine present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands (SERAL DEIS Appendix A). Pertinent projects to consider for cumulative effects mainly involve timber management on private land in the SERAL project area. California Forest Practice Rules (Title 14, California Code of Regulations chapters 4, 4.5, and 10) govern the regulation of timber harvesting on state and private lands in California. Similarly, the USFS implements alternatives and mitigation measures to prevent significant impacts. Thus, significant cumulative effects are not expected to occur for this habitat type in the SERAL project area for any of the alternatives.

C. ***Summary of*** *Fox Sparrow Status and Trend at the Bioregional Scale*

The Stanislaus NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the fox sparrow; hence, the shrubland effects analysis for the project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the fox sparrow. This information is drawn from the detailed information on habitat and population trends in the 2010 Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 1,009,681 acres of west-slope chaparral shrubland habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is slightly increasing (changing from 8% to 9% of the acres on National Forest System lands).

Population Status and Trend. Monitoring of the fox sparrow across the ten National Forests in the Sierra Nevada has been conducted since 2009 in partnership with Point Blue Conservation Science, as part of a monitoring effort that also includes mountain quail, hairy woodpecker, and yellow warbler (USDA Forest Service 2010a, http://data.prbo.org/apps/snamin/#resourceHeadingBioregional, Roberts and Burnett 2016). Fox sparrows were detected on 36.9% of 1659 point counts in 2009 and 38% of 2394 point counts in 2015, with detections on all 10 national forests in all years. From 2010 – 2015, occupancy ranged from 0.47-0.49, highest in 2010 and lowest in 2014 (Roberts and Burnett 2016). These data indicate that fox sparrows continue to be distributed across the 10 Sierra Nevada National Forests, although occupancy is higher in the central and southern Sierra than in the Northern Sierra. In addition, the fox sparrows continue to be monitored and surveyed in the Sierra Nevada at various sample locations by avian point count, spot mapping, mist-net, and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA Forest Service 2008). Current data at the rangewide, California, and Sierra Nevada scales indicate that, although there may be localized declines in the population trend, the distribution of fox sparrow populations in the Sierra Nevada is stable (Roberts and Burnett 2016).

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Fox Sparrow Trend. The proposed project will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of fox sparrows across the Sierra Nevada bioregion.

Oak-Associated Hardwoods and Hardwood/Conifer Habitat (Mule deer)

A. *Habitat/Species Relationship.*

The mule deer was selected as the MIS for oak-associated hardwood and hardwood/conifer in the Sierra Nevada, comprised of montane hardwood (MHW) and montane hardwood-conifer (MHC) as defined by the California Wildlife Habitat Relationships System (CWHR) (CDFG 2005). Mule deer range and habitat includes coniferous forest, foothill woodland, shrubland, grassland, agricultural fields, and suburban environments (CDFG 2005). Many mule deer migrate seasonally between higher elevation summer range and low elevation winter range (Ibid). On the west slope of the Sierra Nevada, oak-associated hardwood and hardwood/conifer areas are an important winter habitat (CDFG 1998).

B. ***Project-level*** *Effects Analysis - Oak-Associated Hardwoods and Hardwood/Conifer Habitat*

Habitat Factor(s) for the Analysis: (1) Acres of oak-associated hardwood and hardwood/conifer habitat [CWHR montane hardwood (MHW), montane hardwood-conifer (MHC)]. (2) Acres with changes in hardwood canopy cover (Sparse=10-24%; Open=25-39%; Moderate=40-59%; Dense=60-100%). (3) Acres with changes in CWHR size class of hardwoods **[**1/2 (Seedling/Sapling)(<6”" dbh); 3 (Pole)(6"-10.9" dbh); (4) (Small tree)(11"-23.9" dbh); 5 (Medium/Large tree)(≥24" dbh)].

Direct and Indirect Effects to Habitat

There are approximately 21,421 acres of oak woodland CWHR type in the project area and this is not expected to change across the action alternatives. Oak woodland has burned less often in recent history than prior to European settlement of western North America (see project EIS for details). As a result, canopy cover, fuel loads, and risk of high severity fire are high. In response, Alternative 1 would treat approximately 60% of montane hardwood and montane hardwood-conifer with non-commercial fuel reduction, commercial fuel reduction, and/or prescribed fire. These activities would reduce ladder fuels, ground cover, canopy cover, and stand density to get closer to the natural range of variation of forest structure, and to reduce the risk of high severity fire. Deer utilize areas with high canopy cover and ground cover for resting, cover from predators, and raising young, but are not highly dependent on large, continuous areas of high canopy habitat. Deer benefit from scattered openings and regular fire return intervals for foraging, so negative effects to habitat are expected to be minimal. Under No Action, direct effects to habitat would not be an issue because no active management would occur. Risk of large-scale high severity fire would remain high, and this may have negative effects on thermal and hiding cover for deer long-term.

Cumulative Effects to Habitat in the Analysis Area. The Forest queried its databases, State databases, and others (SERAL DEIS Appendix A) to determine present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands (SERAL DEIS Appendix A). Pertinent projects to consider for cumulative effects mainly involve timber management on private land in the SERAL project area. California Forest Practice Rules (Title 14, California Code of Regulations chapters 4, 4.5, and 10) govern the regulation of timber harvesting on state and private lands in

California. Similarly, the USFS implements alternatives and mitigation measures to prevent significant impacts. Thus, significant cumulative effects are not expected to occur for this MIS in the SERAL project area for any of the alternatives.

C. ***Summary of*** *Mule Deer Status and Trend at the Bioregional Scale*

The Stanislaus NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the mule deer; hence, the oak-associated hardwood and hardwood/conifer effects analysis for the project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the mule deer. This information is drawn from the detailed information on habitat and population trends in the 2010 Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 808,006 acres of oak-associated hardwood and hardwood/mixed conifer habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is slightly increasing (changing from 5% to 7% of the acres on National Forest System lands).

Population Status and Trend. The mule deer has been monitored in the Sierra Nevada at various sample locations by herd monitoring (spring and fall) and hunter survey and associated modeling (CDFG 2007, 2010). California Department of Fish and Game (CDFG) conducts surveys of deer herds in early spring to determine the proportion of fawns that have survived the winter, and conducts fall counts to determine herd composition (CDFG 2007). This information, along with prior year harvest information, is used to estimate overall herd size, sex and age ratios, three-year average populations, and the predicted number of bucks available to hunt (CDFG 2007, 2010). These data indicate that mule deer continue to be present across the Sierra Nevada, and current data at the rangewide, California, and Sierra Nevada scales indicate that, although there may be localized declines in some herds or Deer Assessment Units, the distribution of mule deer populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Mule Deer Trend. The proposed project will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of mule deer across the Sierra Nevada bioregion.

Early and Mid-Seral Coniferous Forest Habitat (Mountain quail)

A. *Habitat/Species Relationship.*

The mountain quail was selected as the MIS for early and mid-seral coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat in the Sierra Nevada. Early seral coniferous forest habitat is comprised primarily of seedlings (<1" dbh), saplings (1"-5.9" dbh), and pole-sized trees (6"-10.9" dbh). Mid-seral coniferous forest habitat is comprised primarily of small-sized trees (11"-23.9" dbh). The mountain quail is found particularly on steep slopes, in open, brushy stands of conifer and deciduous forest and woodland, and chaparral; it may gather at water sources in the summer, and broods are seldom found more that 0.8 km (0.5 mi) from water (CDFG 2005).

B. ***Project-level*** *Effects Analysis – Early and Mid-Seral Coniferous Forest Habitat*

Habitat Factor(s) for the Analysis: (1) Acres of early (CWHR tree sizes 1, 2, and 3) and mid-seral (CWHR tree size 4) coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat [CWHR ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2, 3, and 4, all canopy closures]. (2) Acres with changes in CWHR tree size class. (3) Acres with changes in tree canopy closure. (4) Acres with changes in understory shrub canopy closure.

Direct and Indirect Effects to Habitat. Fuel reduction treatments are proposed in approximately 75% of early and mid-seral coniferous forest habitat in the project area. Treatments would reduce ladder fuels, ground cover, canopy cover, and stand density to get closer to the natural range of variation of forest structure, and to reduce the risk of high severity fire. Most treatments would take place in areas with high stand density and canopy cover to reduce the continuity of fuels. Mechanical treatments such as pre-commercial thinning and mastication would be used but prescribed fire would be the primary treatment. These treatments would alter mountain quail habitat, however, mid-seral coniferous forest with high canopy cover is well above the natural range of variation and mid-seral coniferous forest with open canopy is well below; therefore, the proposed treatments would bring the project area closer to forest structure found prior to European settlement. Under No Action Alternative 2, direct effects to habitat would not be an issue because no active management would occur. Risk of large-scale high severity fire and overstory mortality from beetle outbreak would remain high. Early and mid-seral habitats do well with fire, but short-term negative effects from very large high severity fires may have short-term negative effects.

Cumulative Effects to Habitat in the Analysis Area. The Forest queried its databases, State databases, and others (SERAL DEIS Appendix A) to determine present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands (SERAL DEIS Appendix A). Pertinent projects to consider for cumulative effects mainly involve timber management on private land in the SERAL project area. California Forest Practice Rules (Title 14, California Code of Regulations chapters 4, 4.5, and 10) govern the regulation of timber harvesting on state and private lands in California. Similarly, the USFS implements alternatives and mitigation measures to prevent significant impacts. Thus, significant cumulative effects are not expected to occur for this MIS in the SERAL project area for any of the alternatives.

C. ***Summary of*** *Mountain Quail Status and Trend at the Bioregional Scale*

The Stanislaus NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the mountain quail; hence, the early and mid-seral coniferous forest effects analysis for the project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the mountain quail. This information is drawn from the detailed information on habitat and population trends in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 530,851 acres of early seral and 2,776,022 acres of mid-seral coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend for early seral is decreasing (changing from 9% to 5% of the acres on National Forest System lands) and the trend for mid-seral is increasing (changing from 21% to 25% of the acres on National Forest System lands). Due to recent (2014-2017) extensive tree mortality in the Southern Sierra Nevada, as well as large fires in the Central Sierra, the decreasing trend in early seral habitat may now be reversing. However, we cannot yet quantify this change, and will update this information when the vegetation mapping products currently in development allow for more direct comparison between pre- and post- mortality conditions. Mid-seral conditions likely continue to increase, as older/larger trees are disproportionately dying, leaving the younger, smaller trees on the landscape.

Population Status and Trend. Monitoring of the mountain quail across the ten National Forests in the Sierra Nevada has been conducted since 2009 in partnership with PRBO Conservation Science, as part of a monitoring effort that also includes fox sparrow, hairy woodpecker, and yellow warbler (USDA Forest Service 2010a,http://data.prbo.org/apps/snamin/#resourceHeadingBioregional, Roberts and Burnett 2016). Mountain quail were detected on 40.3 percent of 1659 point counts in 2009 and 47.4% of 2266 point counts in 2010. Methodology shifted slightly after initial years to consider transects, rather than points, as independent samples and Mountain Quail were detected at 28% of 474 transects in 2014 and 29% of 474 transects in 2015, with detections on all 10 national forests across years. Occupancy was steady across years, ranging from 0.63-0.65 between 2010 and 2015 (Roberts and Burnett 2016). These data indicate that mountain quail continue to be distributed across the 10 Sierra Nevada National Forests. In addition, mountain quail continue to be monitored and surveyed in the Sierra Nevada at various sample locations by hunter survey, modeling, and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA Forest Service 2008). Current data at the range-wide, California, and Sierra Nevada scales indicate that the distribution of mountain quail populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Mountain Quail Trend. The proposed project will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of mountain quail across the Sierra Nevada bioregion.

Late Seral Open Canopy Coniferous Forest Habitat [Sooty (blue) grouse]

A. *Habitat/Species Relationship.*

The sooty grouse was selected as the MIS for late seral open canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures less than 40%. Sooty grouse occurs in open, medium to mature-aged stands of fir, Douglas-fir, and other conifer habitats, interspersed with medium to large openings, and available water, and occupies a mixture of mature habitat types, shrubs, forbs, grasses, and conifer stands (CDFG 2005). Empirical data from the Sierra Nevada indicate that Sooty Grouse hooting sites are located in open, mature, fir-dominated forest, where particularly large trees are present (Bland 2006).

B. ***Project-level*** *Effects Analysis - Late Seral Open Canopy Coniferous Forest Habitat*

Habitat Factor(s) for the Analysis: (1) Acres of late seral open canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat [CWHR ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P]. (2) Acres with changes in tree canopy closure class. (3) Acres with changes in understory shrub canopy closure class.

Direct and Indirect Effects to Habitat. There are currently 0 acres of late seral open canopy coniferous forest habitat in the project area, well below NRV levels. The action alternatives are designed to move the landscape toward NRV conditions and so would increase this habitat type. Alternative 1 would increase it the most to 11,370 acres. Alternatives 3 and 4 would increase this habitat type by 4,958 acres and 4,426 acres respectively. Under Alternative 2 No Action, this habitat type would remain at 0.

Cumulative Effects to Habitat in the Analysis Area. The Forest queried its databases, State databases, and others (SERAL DEIS Appendix A) to determine present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands (SERAL DEIS Appendix A). Pertinent projects to consider for cumulative effects mainly involve timber management on private land in the SERAL project area. California Forest Practice Rules (Title 14, California Code of Regulations chapters 4, 4.5, and 10) govern the regulation of timber harvesting on state and private lands in California. Similarly, the USFS implements alternatives and mitigation measures to prevent significant impacts. Thus, significant cumulative effects are not expected to occur for this MIS in the SERAL project area for any of the alternatives.

C. ***Sum****mary of Sooty Grouse Status and Trend at the Bioregional Scale*

The Stanislaus NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the sooty grouse; hence, the late seral open canopy coniferous forest effects analysis for the project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the sooty grouse. This information is drawn from the detailed information on habitat and population trends in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 63,795 acres of late seral open canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is decreasing (changing from 3% to 1% of the acres on National Forest System lands). Due to recent (2014-2017) extensive tree mortality in the Southern Sierra Nevada, the decreasing trend in open canopy late seral habitat may now be reversing, as tree mortality in older stands creates more open canopy conditions. However, we cannot yet quantify this change, and will update this information when the vegetation mapping products currently in development allow for more direct comparison between pre- and post- mortality conditions.

Population Status and Trend. The sooty grouse has been monitored in the Sierra Nevada at various sample locations by hunter survey, modeling, point counts, and breeding bird survey protocols, including California Department of Fish and Game Blue (Sooty) Grouse Surveys (Bland 1993, 1997, 2002, 2006); California Department of Fish and Game hunter survey, modeling, and hunting regulations assessment (CDFG 2004a, CDFG 2004b); Multi-species inventory and monitoring on the Lake Tahoe Basin Management Unit (LTBMU 2007); and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that sooty grouse continue to be present across the Sierra Nevada, except in the area south of the Kern Gap, and current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of sooty grouse populations in the Sierra Nevada north of the Kern Gap is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Sooty Grouse Trend. The proposed project will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of sooty grouse across the Sierra Nevada bioregion.

Late Seral Closed Canopy Coniferous Forest Habitat (California spotted owl, Pacific marten, and northern flying squirrel)

A. *Habitat/Species Relationship*.

California spotted owl. The California spotted owl was selected as an MIS for late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures above 40% within ponderosa pine, Sierran mixed conifer, white fir, and red fir coniferous forests, and multi-layered trees within ponderosa pine and Sierran mixed conifer forests. The California spotted owl is strongly associated with forests that have a complex multi-layered structure, large-diameter trees, and high canopy closure (CDFG 2005, USFWS 2006). It uses dense, multi-layered canopy cover for roost seclusion; roost selection appears to be related closely to thermoregulatory needs, and the species appears to be intolerant of high temperatures (CDFG 2005). Mature, multi-layered forest stands are required for breeding (Ibid). The mixed-conifer forest type is the predominant type used by spotted owls in the Sierra Nevada: about 80 percent of known sites are found in mixed-conifer forest, with 10 percent in red fir forest (USDA Forest Service 2001).

Pacific Marten. The Pacific[5] marten was selected as an MIS for late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures above 40% within ponderosa pine, Sierran mixed conifer, white fir, and red fir coniferous forests, and multi-layered trees within ponderosa pine and Sierran mixed conifer forests. Martens prefer coniferous forest habitat with large diameter trees and snags, large down logs, moderate-to-high canopy closure, and an interspersion of riparian areas and meadows. Important habitat attributes are: vegetative diversity, with predominately mature forest; snags; dispersal cover; and large woody debris (Allen 1982). Key components for westside and eastside marten habitat can be found in the Sierra Nevada Forest Plan Amendment FEIS (USDA Forest Service 2001), Volume 3, Chapter 3, part 4.4, pages 20-21.

Northern flying squirrel. The northern flying squirrel was selected as an MIS for late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures above 40% within ponderosa pine, Sierran mixed conifer, white fir, and red fir coniferous forests, and multi-layered trees within ponderosa pine and Sierran mixed conifer forests. The northern flying squirrel occurs primarily in mature,

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[5] Formerly identified as the American Marten, reclassified as a separate species following Dawson and Cook 2012.
http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=marten&x=0&y=0;

dense conifer habitats intermixed with various riparian habitats, using cavities in mature trees, snags, or logs for cover (CDFG 2005).

B. ***Project-level*** *Effects Analysis – Late Seral Closed Canopy Coniferous Forest Habitat.*

Habitat Factor(s) for the Analysis: (1) Acres of late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat [CWHR ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), tree size 5 (canopy closures M and D), and tree size 6]. (2) Acres with changes in canopy closure (D to M). (3) Acres with changes in large down logs per acre or large snags per acre.

Direct, indirect, and cumulative effects to late seral closed canopy coniferous forest habitat are covered in the SERAL Biological Evaluation (SERAL project record) under the California spotted owl and Pacific marten section. Refer to that document for in-depth discussions of effects. Flying squirrel is not explicitly discussed in the BE, but this species is an indicator for late seral closed canopy coniferous forest, and effects to that habitat is covered in-depth in the BE.

C. ***Summary of Status and Trend at*** *the Bioregional Scale*

California spotted owl, Pacific marten, and Northern flying squirrel. The Stanislaus NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the California spotted owl, Pacific marten, and northern flying squirrel; hence, the late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat effects analysis for the project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data. This information is drawn from the detailed information on habitat and population trends in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 1,006,923 acres of late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is slightly increasing (changing from 7% to 9% of the acres on National Forest System lands); since the early 2000s, the trend has been stable at 9%. Due to recent (2014-2017) extensive tree mortality, the increasing trend in closed canopy late seral habitat appears to be reversing in the Southern Sierra, as tree mortality in older stands creates more open canopy conditions. This may be the case for mixed conifer and pine forests, and less so for white and red fir habitats. However, we cannot yet quantify this change, and will update this information when the vegetation mapping products currently in development allow for more direct comparison between pre- and post- mortality conditions.

Population Status and Trend - California spotted owl. California spotted owl has been monitored in California and throughout the Sierra Nevada through general surveys, monitoring of nests and territorial birds, and demography studies (Verner et al. 1992; Gutierrez et al. 2008, 2009, 2010; USDA Forest Service 2001, 2004, 2006b; USFWS 2006; Sierra Nevada Research Center 2007, 2008, 2009, 2010). Current data at the rangewide, California, and Sierra Nevada scales indicate that, although there have been localized declines in population trend [e.g., localized decreases in "lambda" (estimated annual rate of population change) within three of the four demographic study areas (Tempel et al. 2014, Tempel et al. 2016)], the distribution of California spotted owl populations in the Sierra Nevada is stable and relatively contiguous (Gutierrez et al. in Press).

Population Status and Trend – Pacific marten. Pacific marten has been monitored throughout the Sierra Nevada as part of general surveys and studies since 1996 (e.g., Zielinski et al. 2005, Moriarty 2009). Since 2002, the Pacific marten has been monitored on the Sierra Nevada forests as part of the Sierra Nevada Forest Plan Amendment (SNFPA) monitoring plan (USDA Forest Service 2005, 2006b, 2007b, 2009, 2010b)[6]. Current data at the rangewide, California, and Sierra Nevada scales indicate that, although marten appear to be distributed throughout their historic range, their distribution has become fragmented in the southern Cascades and northern Sierra Nevada, particularly in Plumas County. The distribution appears to be continuous across high-elevation forests from Placer County south through the southern end of the Sierra Nevada, although detection rates have decreased in at least some locatized areas (e.g., Sagehen Basin area of Nevada County).

Population Status and Trend – northern flying squirrel. The northern flying squirrel has been monitored in the Sierra Nevada at various sample locations by live-trapping, ear-tagging, camera surveys, snap-trapping, and radiotelemetry: 2002-present on the Plumas and Lassen National Forests (Sierra Nevada Research Center 2007, 2008, 2009, 2010), and 1958-2004 throughout the Sierra Nevada in various monitoring efforts and studies (see USDA Forest Service 2008, Table NOFLS-IV-1). These data indicate that northern flying squirrels continue to be present at these sample sites, and current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of northern flying squirrel populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trends.

California spotted owl. The proposed project will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of California spotted owl across the Sierra Nevada bioregion.

Pacific marten. The proposed project will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of Pacific marten across the Sierra Nevada bioregion.

Northern flying squirrel. The proposed project will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of Northern flying squirrel across the Sierra Nevada bioregion.

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[6] Identified in these references as American marten, prior to nomenclature change (Dawson and Cook 2012)

Snags in Green Forest Ecosystem Component (Hairy woodpecker)

A. *Habitat/Species Relationship.*

The hairy woodpecker was selected as the MIS for the ecosystem component of snags in green forests. Medium (diameter breast height between 15 to 30 inches) and large (diameter breast height greater than 30 inches) snags are most important. The hairy woodpecker uses stands of large, mature trees and snags of sparse to intermediate density; cover is also provided by tree cavities (CDFG 2005). Mature timber and dead snags or trees of moderate to large size are apparently more important than tree species (Siegel and DeSante 1999).

B. ***Project-level*** *Effects Analysis – Snags in Green Forest Ecosystem Component*

Habitat Factor(s) for the Analysis: (1) Medium (15-30 inches dbh) snags per acre. (2) large (greater than 30 inches dbh) snags per acre.

Direct and Indirect Effects to Habitat. Acreage of this habitat type varies little and remains high across all alternatives. Mechanical thinning and prescribed fire would be used to reduce the probability of large-scale high severity fire. Without treatment, green forest within the project area would remain at high risk of large-scale mortality which would add snags but decrease green forest habitat. Under all action alternatives, a minimum of 4 snags per acre would be retained in mixed conifer and 6 snags per acre in red fir. Snag retention requirements and limitations on salvage would minimize impacts from project activities. Under No Action Alternative 2, direct effects to habitat would not be an issue because no active management would occur. Risk of large-scale high severity fire and overstory mortality from beetle outbreak would remain high, and this would have negative effects if fires were large and severe enough to reduce a significant quantity of available green forest habitat.

Cumulative Effects to Habitat in the Analysis Area. The Forest queried its databases, State databases, and others (SERAL DEIS Appendix A) to determine present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands (SERAL DEIS Appendix A). Pertinent projects to consider for cumulative effects mainly involve timber management on private land in the SERAL project area. California Forest Practice Rules (Title 14, California Code of Regulations chapters 4, 4.5, and 10) govern the regulation of timber harvesting on state and private lands in California. Similarly, the USFS implements alternatives and mitigation measures to prevent significant impacts. Thus, significant cumulative effects are not expected to occur for this MIS in the SERAL project area for any of the alternatives.

C. ***Summary of*** *Hairy Woodpecker Status and Trend at the Bioregional Scale*

The Stanislaus NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the hairy woodpecker; hence, the snag effects analysis for the project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the hairy woodpecker. This information is drawn from the detailed information on habitat and distribution population trends in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Ecosystem Component Status and Trend. The current average number of medium-sized and large-sized snags (≥ 15" dbh, all decay classes) per acre across major coniferous and hardwood forest types (westside mixed conifer, ponderosa pine, white fir, productive hardwoods, red fir, eastside pine) in the Sierra Nevada ranges from 1.5 per acre in eastside pine to 9.1 per acre in white fir. In 2008, snags in these types ranged from 1.4 per acre in eastside pine to 8.3 per acre in white fir (USDA Forest Service 2008).

Data from the early-to-mid 2000s were compared with the current data to calculate the trend in total snags per acre by Regional forest type for the 10 Sierra Nevada national forests and indicate that, during this period, snags per acre increased within westside mixed conifer (+0.76), white fir (+2.66), productive hardwoods (+0.35), and red fir (+1.25) and decreased within ponderosa pine (-0.16) and eastside pine (-0.14)

Detailed information by forest type, snag size, and snag decay class can be found in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a). Due to recent (2014-2017) extensive tree mortality in the Southern Sierra Nevada, it is likely that significant increases in snags per acre have occurred in the pine and mixed conifer forest types, particularly in the Southern Sierra National Forests. Other national forests within the Sierra Nevada also may have significant increasing trends. However, we cannot yet quantify these changes, and will update this information when the vegetation mapping products currently in development allow for more direct comparison between pre- and post- mortality conditions.

Population Status and Trend. Monitoring of the hairy woodpecker across the ten National Forests in the Sierra Nevada has been conducted since 2009 in partnership with PRBO Conservation Science, as part of a monitoring effort that also includes mountain quail, fox sparrow, and yellow warbler (USDA Forest Service 2010a, http://data.prbo.org/apps/snamin/#resourceHeadingBioregional, Roberts and Burnett 2016). Hairy woodpeckers were detected on 15.1% of 1659 point counts (and 25.2% of 424 playback points) in 2009 and 16.7% of 2266 point counts (and 25.6% of 492 playback points) in 2010, with detections on all 10 national forests in both years. Methodology shifted slightly after initial years to consider transects, rather than points, as independent samples and Hairy Woodpeckers were detected at 54% of 474 transects in 2014 and 58% of 474 transects in 2015. Hairy Woodpecker population distributions have shown a slow but significant increase from 2010 to 2015 (Roberts and Burnett 2016). These data indicate that hairy woodpeckers continue to be distributed across the 10 Sierra Nevada National Forests. In addition, the hairy woodpeckers continue to be monitored and surveyed in the Sierra Nevada at various sample locations by avian point count and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA Forest Service 2008). Current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of hairy woodpecker populations in the Sierra Nevada is stable or increasing.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Hairy Woodpecker Trend. The proposed project will not alter the existing trend in the ecosystem component, nor will it lead to a change in the distribution of hairy woodpecker across the Sierra Nevada bioregion.

Snags in Burned Forest Ecosystem Component (Black-backed woodpecker)

A. *Habitat/Species Relationship.*

The black-backed woodpecker was selected as the MIS for the ecosystem component of snags in burned forests. Recent data indicate that black-backed woodpeckers are dependent on snags created by stand-replacement fires (Hutto 1995, Kotliar et al. 2002, Smucker et al. 2005). The abundant snags associated with severely burned forests provide both prey (by providing food for the specialized beetle larvae that serve as prey) and nesting sites (Hutto and Gallo 2006).

B. ***Project-level*** *Effects Analysis – Snags in Burned Forest Ecosystem Component*

Habitat Factor(s) for the Analysis: (1) Medium (15-30 inches dbh) snags per acre within burned forest created by stand-replacing fire, (2) large (greater than 30 inches dbh) snags per acre within burned forest created by stand-replacing fire.

Direct and Indirect Effects to Habitat. Currently there are 517 acres of this habitat in the project area, primarily unsalvaged acres of the 2013 Power Fire. This would not change across any of the action alternatives. Under adaptive management prescriptions, any future NRV based needs for salvage would be limited and there are snag retention requirements (see SERAL DEIS). Under No Action Alternative 2, risk of large-scale high severity fire and overstory mortality from beetle outbreak would remain high. Black-backed woodpeckers utilize burned snag habitat from high intensity fires, but also rely on adjacent green forest (Stillman et al. 2019; Verschuyl et al. 2021). High-severity fire would increase habitat for this species.

Cumulative Effects to Habitat in the Analysis Area. The Forest queried its databases, State databases, and others (SERAL DEIS Appendix A) to determine present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands (SERAL DEIS Appendix A). Pertinent projects to consider for cumulative effects mainly involve timber management on private land in the SERAL project area. California Forest Practice Rules (Title 14, California Code of Regulations chapters 4, 4.5, and 10) govern the regulation of timber harvesting on state and private lands in California. Similarly, the USFS implements alternatives and mitigation measures to prevent significant impacts. Thus, significant cumulative effects are not expected to occur for this MIS in the SERAL project area for any of the alternatives.

C. ***Summary of Black-backed Woodpecker Status and Trend at*** *the Bioregional Scale*

The Stanislaus NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the black-backed woodpecker; hence, the snags effects analysis for the project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the black-backed woodpecker. This information is drawn from the detailed information on habitat and distribution population trends in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Ecosystem Component Status and Trend. The current average number of medium-sized and large-sized snags ($\geq$ 15" dbh, all decay classes) per acre across major coniferous and hardwood forest types (westside mixed conifer, ponderosa pine, white fir, productive hardwoods, red fir, eastside pine) in the Sierra Nevada ranges from 1.5 per acre in eastside pine to 9.1 per acre in white fir. In 2008, snags in these forest types ranged from 1.4 per acre in eastside pine to 8.3 per acre in white fir (USDA Forest Service 2008).

Data from the early-to-mid 2000s were compared with the current data to calculate the trend in total snags per acre by Regional forest type for the 10 Sierra Nevada national forests and indicate that, during this period, snags per acre increased within westside mixed conifer (+0.76), white fir (+2.66), productive hardwoods (+0.35), and red fir (+1.25) and decreased within ponderosa pine (-0.16) and eastside pine (-0.14).

Detailed information by forest type, snag size, and snag decay class can be found in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

These data include snags in both green forest and burned forest. Between 2000 and 2007, 211,000 acres underwent severe burn and 176,000 acres underwent moderate burn in the Sierra Nevada.

Population Status and Trend. Monitoring of the black-backed woodpecker across the 10 National Forests in the Sierra Nevada has been conducted since 2008 in partnership with the Institute for Bird Populations (IBP) (USDA Forest Service 2010a, http://www.birdpop.org/pages/blackBackedWoodpecker.php, Siegel et al. 2016). In 2008, black-backed woodpeckers were detected at 68 survey stations distributed across 10 of the 19 fire areas surveyed. In 2009, black-backed woodpeckers were detected at 169 survey station distributed across 28 of the 51 fire areas surveyed. In both years, occupied sites were well distributed across the Sierra Nevada National Forests, included burned areas of a variety of sizes, and included areas 1 to 10 years post-fire. In 2015, black-backed woodpeckers were detected at 193 survey points across 31 of 50 recent fire areas, well distributed across the Sierra Nevada National Forests and across nearly the full latitudinal range of the monitoring area (Siegel et al. 2016) These data indicate that black-backed woodpeckers continue to be distributed across the 10 Sierra Nevada National Forests. Additionally, mean occupancy probability for stations surveyed during 2009 was 0.253 (95% credible interval: 0.222 – 0.289); and 0.22 in 2015 (95% credible interval: 0.21 – 0.23). Mean fire occupancy in 2015 was 0.65, compared to 0.52 in 2014, and relatively comparable to prior years (Siegel et al. 2016). There are no observed trends in occupancy or proportion of fires occupied over the seven years between 2009 and 2015 (Siegel et al. 2016). Black-backed woodpeckers remain present across their historical range in California (Siegel et al. 2016). In addition, the black-backed woodpeckers continue to be surveyed in the Sierra Nevada at various sample locations by avian point count, spot mapping, mist-net, and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA Forest Service 2008). Current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of black-backed woodpecker populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Black-Backed Woodpecker Trend. The proposed project will not alter the existing trend in the ecosystem component, nor will it lead to a change in the distribution of black-backed woodpecker across the Sierra Nevada bioregion.

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